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Paper No. 55

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MITSUBISHI MATERIALS CORPORATION

Appeal No. 2001-0310
Application No. Application No. 90/004,385

HEARD: May 17, 2001

Before HANLON, PAK, and LIEBERMAN, Administrative Patent Judges.
PAK, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § § 134 and 306 from the examiner's final rejection of claims 1 through 10, which are all of the claims pending in the present application (Reexamination Control No. 90/004,385) involving reexamination of U.S. Patent 5,320,662 issued June 14, 1994.¹

¹ This appeal is related to Appeal Nos. 2000-2073, 1999-2411 and 1999-2318, the appeals
(continued...)

APPEALED SUBJECT MATTER

According to the appellants, the subject matter on appeal, like the subject matter of the applied prior art references, i.e., Smith and Hoffmann, is directed to “a process wherein the CONTINUOUS flow of blister copper from a continuous blister copper producing furnace is directly refined using batch-wise operating anode furnaces.” See, e.g., the Brief, page 6. The appellants’ invention is said to lie in employing a particular blister copper launder means for conveying molten copper from the blister copper producing furnace to the batch-wise operating anode furnaces. See the Brief in its entirety. Details of the appealed subject matter are provided in illustrative claims 1, 2 and 6, which are reproduced below:

1. A copper smelting process comprising the steps of:
providing a blister copper producing means, a plurality of anode furnaces and blister copper launder means connecting said blister copper producing means and said anode furnaces;
producing blister copper in said blister copper-producing means;
subsequently causing said blister copper produced in said blister copper producing means to flow from said blister copper producing means directly through said blister copper launder means and into one of said anode furnaces; and
refining said blister copper into copper of high purity in said anode furnaces.
2. The process as recited in claim 1, wherein said refining step includes the steps of:
receiving the blister copper tapping through said blister copper means in said anode furnaces;
oxidizing the blister copper in said anode furnace by blowing oxidizing gas into said anode furnace;

¹(...continued)
from the final rejections of the claims pending in Reexamination Control Nos. 90/004,386, 90/004,782 and 90/004,783, respectively.

subsequently reducing the oxidized copper in said anode furnace into the copper of higher purity;
subsequently discharging said copper of higher purity from said anode furnace; and wherein said blister copper receiving step and said oxidizing step are carried out at least partly overlapping fashion.

6. The process of claim 5, wherein said step of causing said blister copper produced in said blister copper-producing means to flow from said blister copper-producing means directly through said blister copper launder means and into one of said anode furnaces further comprises selectively bridging said main into fluid communication with said first branch launder.

PRIOR ART REFERENCES

As evidence of obviousness, the examiner relies on the following prior art references:

| | | |
|---------------------------------------|-----------|---------------|
| Kappell et al (Kappell) | 4,245,821 | Jan. 20, 1981 |
| LeBate | 4,390,169 | Jun. 28, 1983 |
| Hoffmann et al. (Hoffmann) | 4,421,552 | Dec. 20, 1983 |
| Bibby | 16,273 | Sep. 24, 1891 |
| (Published Great Britain Application) | | |
| Ikoma ² | 61-52327 | Mar. 15, 1986 |
| (Published Japanese Application) | | |

A. K. Biswas et al. (Biswas), "Preparation of Anodes: Sulphur and Oxygen Removal," in Extractive Metallurgy of Copper, pp. 242-245 (New York, Pergamon Press, 1976).

T. J. A. Smith et al. (Smith), "Oxygen Smelting and the Olympic Dam Project," in G. Kachaniwsky et al. (Editor), Proceedings of the International Symposium on The Impact of

² Our reference to Ikoma is to its corresponding English translation of record.

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Oxygen on the Productivity of Non-Ferrous Metallurgical Processes, pp. 49-59 (New York, Pergamon Press, 1987).

The appellants rely on the following references³:

Kirk-Othmer Encyclopedia of Chemical Technology, Third Edition, Volume 6, John Wiley and Sons, pp 829-838 (1979) (hereinafter referred to as "Exhibit A").

Dale W. Rodolff et al., "Review of Flash Smelting and Flash Converting Technology," in TMS Technical Paper, Paper No. A86-64, pp. 1-31 (1986)(hereinafter referred to as "Exhibit F").

Anjala et al., "Outokumpu Flash Smelting in Copper Metallurgy-The Latest Developments and Applications" in (Editor), Volume 4, Pyrometallurgy of Copper, pp. 19-35, New York, unknown publication date, (hereinafter referred to as "Exhibit H").

Anjala et al., "Oxygen Smelting and the Olympic Dam Project" in, G. Kachaniwsky et al. (Editor), The Impact of Oxygen on the Productivity of Non-Ferrous Metallurgical Processes, Pergamon Press, pp. 49-59 (1987)(hereinafter referred to as "Exhibit I").

Anjala et al., "The Role of Oxygen in the Outokumpu Flash Smelting Process," in G. Kachaniwsky et al. (Editor), The Impact of Oxygen on the Productivity of Non-Ferrous Metallurgical Processes, Pergamon Press, pp. 87-105 (1987)(hereinafter referred to as "Exhibit G").

Rana et al., "Converting Alternatives for Copper Smelting Processes," pp. 91-105, unknown publication date, (hereinafter referred to as "Exhibit E").

Kirk-Othmer Encyclopedia of Chemical Technology, Fourth Edition, Volume 7, John Wiley and Sons, pp 393-428 (1993) (hereinafter referred to as "Exhibit B").

Iida et al., "Process Designs on New Smelter Projects of the Mitsubishi Continuous Copper Smelting and Converting Process," A Paper To Be Presented at the 36th annual Conference of Metallurgists of CIM (1997) (Hereinafter referred to as "Exhibit Z")

REJECTIONS

The appealed claims stand rejected as follows:

³ In addition to the references below, the appellants refer to the prior art references relied upon by the examiner and provide them with certain exhibit designations.

- (1) Claims 1, 5, 6, 7, 9 and 10 under 35 U.S.C. § 103 as unpatentable over either Smith or Hoffmann in view of Bibby and LeBate ;
- (2) Claims 2 through 4 under 35 U.S.C. § 103 as unpatentable over either Smith or Hoffmann in view of Bibby, LeBate, Biswas and Kappell; and
- (3) Claim 8 under 35 U.S.C. § 103 as unpatentable over either Smith or Hoffmann in view of Bibby, LeBate and Ikoma.

OPINION

We have carefully reviewed the claims, specification and applied prior art, including all of the arguments and evidence advanced by the examiner and the appellants in support of their respective positions. This review leads us to conclude that the examiner's Section 103 rejections are well founded. Accordingly, we affirm the examiner's Section 103 rejections for essentially those reasons set forth in the Answer and below.

We begin with the claim language. *Gechter v. Davidson*, 116 F.3d 1454, 1457, 43 USPQ2d 1030, 1032 (Fed. Cir. 1997); *In re Paulsen*, 30 F.3d 1475, 1479, 31 USPQ2d 1671, 1674 (Fed. Cir. 1994). Generally, we give the broadest reasonable interpretation to the terms in the claims consistent with the appellants' specification in reexamination proceedings. *See, e.g., In re Yamamoto*, 740 F.2d 1569, 1571, 222 USPQ 934, 936 (Fed. Cir. 1984). When the terms in the claims are written in "means-plus-function" formats, however, we interpret them as being limited to the corresponding structure described in the specification and equivalents thereof in accordance with

the requirements of 35 U.S.C. § 112, paragraph 6. *In reDonaldson*, 16 F.3d 1189, 1193, 29 USPQ2d 1845, 1848 (Fed. Cir. 1994)(*in banc*). The manner in which a “means-plus-function” element is expressed, either by a function followed by the term “means” or by the term “means for” followed by a function, is unimportant so long as the modifier of that term specifies a function to be performed. *Ex part Klumb*, 159 USPQ 694, 695 (Bd. App. 1967). The use of the term “means” raises a presumption that the means-plus-function element is intended. *See Sage Prods. Inc. v. Devon Indus., Inc.*, 126 F.3d 1420, 1427, 44 USPQ2d 1103, 1109 (Fed. Cir. 1997). Nevertheless, such presumption is not applicable if a claim recites sufficient structures for carrying out the function of the means-plus-function element. *See Enviroco Corp v. Clestra Cleanroom, Inc.*, 209 F. 3d 1360, 1364-65, 54 USPQ2d 1449, 1452-53 (Fed. Cir. 2000); *Al-Site Corp. v. VSI International Inc.*, 174 F.3d 1308, 1319, 50 USPQ2d 1161, 1167 (Fed. Cir. 1999); *Unidynamics Corp. V. Automatic Products International Ltd.*, 157 F.3d 1311, 1319, 48 USPQ2d 1099, 1104-1105 (Fed. Cir. 1998).

Applying the above precedents to the present case, we determine that the terms “blister copper producing means” and “blister copper launder means” recited in claim 1 are means-plus-function elements within the meaning of 35 U.S.C. § 112, paragraph 6. See also the appellants’ admission at, e.g., Supplemental Brief, pages 1-9. Nowhere does claim 1 recite sufficient structural limitations for either the claimed “blister copper launder means (means for laundering blister copper)” or “blister copper producing means (means for producing blister copper)”. *See*

Unidynamic Corp., 157 F.3d at 1319, 48 USPQ2d at 1105. Thus, we consult the specification⁴ to determine the scope of the claimed “blister copper producing means” and “blister copper launder means” recited in claim 1 consistent with 35 U.S.C. § 112, paragraph 6.

We observe that the specification defines “blister copper producing means” as follows (U.S. Patent 5,320,662, column 3, lines 28-56):

As is the case with the prior art smelting apparatus, the continuous copper smelting apparatus [in accordance with the present invention] includes a smelting furnace 1 for melting and oxidizing copper concentrates to produce a mixture of matte M and slag S, a separating furnace 2 for separating the matte M from the slag S, a converting furnace 3 for oxidizing the matte M separated from the slag S to produce blister copper, and a plurality of anode furnaces 4 for refining the blister copper thus produced in the converting furnace 3 into copper of higher purity. The smelting furnace 1, the separating furnace 2 and the converting furnace 3 are arranged so as to have different elevations in the descending order, and melt launder means comprised of inclined launders 7A and 7B defining fluid passageways for the melt are provided so as to connect the above three furnaces in series. Thus, the melt is tapped from the smelting furnace 1 through the launder 7A to the separating furnace 2 and from the separating furnace 2 through the launder 7B down into the converting furnace 3. Furthermore, in each of the smelting furnace 1 and the converting furnace 3, a plurality of lances 5 each composed of a double-pipe structure are inserted through the furnace roof and secured thereto for vertical movement, and the copper concentrates, oxygen-enriched air, flux and so on are supplied into each furnace through these lances 5. Furthermore, the separating furnace 2 is composed of an electric furnace equipped with a plurality of electrodes 6.

It follows that the claimed “blister copper producing means” includes the above-mentioned structural arrangement and the equivalents thereof. We determine that this structural arrangement is capable of producing blister copper continuously. See, e.g., U.S. Patent 5,320,662, column 3, lines

⁴ The specification referred to herein is the written description provided in U.S. Patent 5,320,662 which is subject of the present reexamination proceeding.

24-32. However, contrary to the appellants' position at, e.g., page 2 of the Reply brief and pages 2-4 of the Supplemental Appeal Brief, we do not believe that the claims on appeal require that this structural arrangement be operated in a continuous manner. We shall not import a process limitation (continuous operation) disclosed in the specification into the claims on appeal based on the means-plus-function limitation that corresponds to the structure described in the specification. *Yamamoto*, 740 F.2d at 1571, 222 USPQ at 936.

We observe that the specification defines "blister copper launder means" as follows (U.S. Patent 5,320,662, column 3, line 61 to column 4, line 4):

The launder means 11, through which the blister copper produced in the converting furnace 3 is transferred to the anode furnaces 4, includes an upstream main launder 11A connected at its one end to the outlet of the converting furnace 3 and sloping downwardly in a direction away from the converting furnace 3, and a pair of downstream branch launders 11B and 11B branched off from the main launder 11A so as to be inclined downwardly in a direction away from the main launder 11A and connected at their ends to the anode furnaces 4 and 4, respectively....

We observe that a selective means is separate from a launder means as can be seen from the specification (U.S. Patent 5,320,662, column 4, lines 5-15):

Furthermore, means 12 for selectively bringing the main launder 11A into fluid communication with one of the branch launders 11B is provided at the junction between the main launder 11A and the branch launders 11B. This means 12 may be of any structure. In the simplest form, that portion of each branch launder 11B adjacent to the junction with the main launder 11A may be formed such that its-bottom is somewhat shallow, and a castable or a lump or refractory material may be cast into the shallow portion of the branch launder 11B which is not be utilized.

Thus, we interpret "blister copper launder means" as including only branched launders and the equivalents thereof.⁵ This interpretation is supported not only by the above-mentioned written description in the specification, but also by the other claims on appeal. Dependent claim 6, for example, recites "[t]he process of claim 5....further comprises selectively bridging said main launder into fluid communication with said first branch launder" as if the blister copper launder means recited in claims 1 and 5 does not employ a selecting means for the above selective bridging function. To interpret claims 1 and 5 as including a selecting **means** is to render the scope of dependent claim 6 broader than those of its parent claims, i.e., claims 1 and 5, in violation of the requirements of 35 U.S.C. § 112, paragraph 4. Compare claim 6 with claims 1 and 5. Indeed, the appellants do not take the position that the blister copper launder means also contain a selecting device. See the Supplemental Appeal Brief in its entirety.

Having interpreted the claims on appeal as indicated *supra*, we now compare the claimed subject matter with the teachings of the prior art references. We find that Smith teaches "[b]lister copper laundered directly to one of two rotary anode furnaces." See page 57. We find that Hoffmann, like Smith, teaches that "[b]lister copper ... continuously overflows a syphon and is conveyed by launder at the rate of 459 metric tons per day to the anode furnaces." See column 4, lines 58-61. We find that Hoffman also teaches that "[b]lister copper from the furnace flows

⁵ Our previous decision involving a remand order to the examiner inadvertently states that the claimed "blister copper launder means" includes a selecting means. However, the appellants do not assert that the claimed "blister copper launder means" contain a selecting means.

directly by heated launder to one of the two anode furnaces.” See column 5, lines 11-12. We find that implicit in the above teachings of both Smith and Hoffmann is that blister copper is alternately conveyed from a blister copper producing furnace to a plurality of anode furnaces (filling one anode furnace at a time)⁶. *See In re Preda*, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968)(In evaluating the content of the prior art references, it is proper to take into account not only the specific teachings of the prior art references, but also the inferences which one skilled in the art would reasonably be expected to draw therefrom).

The appellants do not dispute the examiner’s finding that both Smith and Hoffmann teach the claimed “blister copper producing means”⁷ and the claimed “blister copper refining furnaces”. Compare the Answer, page 4, with the Brief, the Reply Brief and Supplemental Brief in their entirety. Rather, the appellants argue that the applied prior art references would not have suggested employing the claimed launder means, i.e., a branched launder, in the copper smelting apparatus process described in either Smith or Hoffman. We do not agree.

⁶ The appellants, like Smith and Hoffmann, convey blister copper from a blister copper producing means to **one** of the anode furnaces. Compare the claims on appeal with Smith and Hoffmann. In other words, the anode furnaces are filled with blister copper one at a time. In fact, in a related appeal, Appeal No. 2000-2073, the appellants do not dispute the examiner’s finding that “both the systems of Smith and ...Hoffmann...specifically require a launder structure which would allow for delivery of molten copper products (blister copper) from a single upstream furnace alternately to a plurality of downstream furnaces...”

⁷ The appellants also acknowledge in their specification that the claimed blister copper producing means is well known. See U.S. Patent 5,320,662, column 1, lines 14-39.

As indicated *supra*, both Smith and Hoffmann teach using launders in general⁸, inclusive of both branched and/or unbranched launders, to convey blister copper from the claimed blister copper producing means to the claimed blister copper refining furnaces (anode furnaces). As also indicated *supra*, these launders are used to alternately convey blister copper from the claimed blister copper producing means to at least two anode furnaces. Although both Smith and Hoffmann do not specify that their launders are branched launders, substantial evidence supports the examiner's finding (Answer, pages 5-6) that:

Bibby teaches, in both figure 2, and at page 3, lines 30-35 that it is known in the copper refining art to employ a launder, or "gutter" structure comprising a main launder connected at one end to an upstream copper refining or producing furnace, and at the other end to a plurality of "branch" launders or gutters, which are in turn connected to a plurality of downstream copper producing or refining furnaces, for the purpose of transporting molten copper products alternately to one of the two downstream copper refining furnaces. Bibby does not specifically teach a "selecting device" for the supply of molten copper from the main launder to one or the other of

⁸ According to the appellants, the launders mentioned in Smith should be interpreted as being limited to unbranched launders since the drawings in Exhibits E, F, G, H and I, which are drawn to the same Olympic Dam project as that described in Smith, exemplify only unbranched launders. See the Brief, pages 5, 6 and 26-29. However, we do not read the generic term "launder" used in Smith as being limited to the two unbranched launders illustrated in Exhibits E, F, G, H, and I since Smith does not explicitly limit the launders described therein to an illustrated embodiment. *See, e.g., In re Lamberti*, 192 USPQ 278, 280 (CCPA 1976) ("all disclosures of the prior art, including unpreferred embodiments, must be considered."). However, even were we to determine that Smith is limited to unbranched launders, the outcome is not altered for two reasons. First, Hoffmann still teaches employing launders in general, inclusive of both branched and non-branched launders. Second, Bibby teaches that its branched launders can perform the same function as unbranched launders, i.e., alternately conveying molten copper from an upstream furnace to a plurality of downstream furnaces, thus providing a suggestion to substitute one for the other.

the branch launders. However Bibby states that the two furnaces C are connected to furnace B by gutter (launder) means “whereby the two latter furnaces can be used alternately”. This arrangement recited by Bibby would not be possible if there were not some type of “selecting device” for diverting the flow of molten material down gutter (b) to one or the other of the other of the two downstream furnaces(C).

Under these circumstances, we concur with the examiner that it would have been *prima facie* obvious to employ the branched launders, including those having a known selecting device, recited in claims 1, 5, 6, 9 and 10 in the copper smelting process of Smith or Hoffmann to alternately convey blister copper from the blister copper producing means to the anode furnaces. From our perspective, the combined teachings of either Smith and Bibby or Hoffmann and Bibby would have led one of ordinary skill in the art to employ known launders, including branched launders having, e.g., some sort of known selecting devices, to alternately transport or convey molten copper from the blister copper producing means to the anode furnaces, motivated by a reasonable expectation of successfully transporting molten copper in the manner (alternating flow) suggested in Smith or Hoffmann.

In addition to the above suggestion and reasonable expectation success found in the applied prior art references, we determine that simple observation of branched and unbranched launders would have also revealed to one of ordinary skill in the art that the branched launders (having a number of branches attached to the main launder) are more advantageous than the unbranched launders in terms of the cost associated with, *inter alia*, the length and number of launders needed to convey molten copper from a blister copper producing furnace to a plurality of blister copper refining (anode) furnaces, the number of holes needed in the blister copper producing furnace for a

given number of launders and anode furnaces employed and the avoidance of the potential leakage associated with the increased number of holes present in the blister copper producing furnace.

Compare *In re Ludwig*, 353 F.2d 241, 147 USPQ 420 (CCPA 1965). Thus, the economic advantages readily apparent from simple observation of the branched launders taught by Bibby (as opposed to unbranched launders) alone would also have led one of ordinary skill in the art to the claimed subject matter. **See *In re Thompson***, 545 F.2d 1290, 1294, 192 USPQ 275, 277 (CCPA 1976)(“Eliminating the cost of the preliminary step of wax impregnation would have been sufficient motivation for doing so.”); ***In re Clinton***, 527 F.2d 1226, 1228, 188 USPQ 365, 367 (CCPA 1976)(“Economics alone would motivate a person of ordinary skill in the art...”)⁹.

The appellants argue that one of ordinary skill in the art would not have looked to the branched launders taught by Bibby to improve the copper smelting apparatus system of Smith or Hoffmann since Bibby teaches its branched launders in the context of a batch system.¹⁰ See the Brief, pages 30-31. In so arguing, the appellants ignore the combined teachings of the prior art

⁹ **See also *In re Sovish***, 769 F.2d 738, 743 226 USPQ 771,774, (Fed. Cir. 1985) (Skill must be presumed on the part of those skilled in the art); ***In re Bozek***, 416 F.2d 1385, 1390, 163 USPQ 545, 549 (CCPA 1969) (the conclusion of obviousness may be made from "common knowledge and common sense" of the person of ordinary skill in the art).

¹⁰ According to the appellants, the three McCain declarations of record demonstrate that “[e]ach stage of refining described in Bibby is run batch-wise...” See the Brief, page 31. We note that the blister copper refining (anode) furnaces recited in the claims on appeal and described in Smith or Hoffmann are run batch-wise. See, e.g., the Brief, page 6.

references.¹¹ We find that both Smith and Hoffman teach employing known launders, inclusive of the branched launders taught by Bibby, to alternately convey molten copper from a blister copper producing furnace to a plurality of blister copper refining (anode) furnaces as indicated *supra*. As the whole purpose of both the branched and unbranched launders is to convey molten copper from one furnace to another, one of ordinary skill in the art would have looked to the branched launders described in Bibby, regardless of their uses in a continuous or batch-wise process, to improve the transport or conveyance of molten copper from a blister copper producing furnace to a plurality of blister copper refining (anode) furnaces.¹² This is especially true since Bibby specifically teaches that its branched launders are useful for alternately conveying molten copper from an upstream furnace to a plurality of downstream furnaces.

Even were we to interpret claims 1, 5, 6, 9 and 10 as requiring a specific selecting device, e.g., the fluid passageway closing device recited in claim 7 or the equivalents thereof¹³, our conclusion would not be altered. As indicated above, Bibby implicitly teaches employing “a selector device of some type” in its branched launder to alternately convey molten copper from an

¹¹ The appellants also ignore that the copper smelting process, as claimed, can be operated in a batch-wise manner. See, e.g., claim 1 on appeal.

¹² Contrary to the appellants’ arguments, there is nothing in Exhibits A, B and E to show that the branched launders described in Bibby cannot be used as the launders of Smith’s or Hoffmann’s copper smelting system.

¹³ This is highly unlikely since the appellants’ specification states that their selecting means “may be [made] of any structure” as indicated *supra*.

upstream furnace into a plurality of downstream furnaces. Although Bibby does not specify the structure of its selecting device, we share the examiner's view that LaBate teaches the claimed selecting device, i.e., a passageway closing device. See the Answer, page 6. Specifically, we find that LaBate teaches a hot metal gate, which is conventionally used to block or divert the flow of molten metal through a runner (launder) system or in an apparatus. See column 1, lines 14-16, 30-33 and 58-64. The hot metal gate can be made of a refractory material **or** a mixture of a refractory material and a consumable material. See column 1, lines 30-39 and 58-68. The consumable material **may be** added so that "the gate has a known life when subjected to molten metal." See column 1, lines 36-39. "An exterior graphite coating may be used to increase the life of the gate by resisting erosion by the molten metal or slag. The gate is movable in and out of the runners (the fluid passageways of the launders) by a lifting device." See column 1, lines 42-46.

Given the above teachings, we determine that one of ordinary skill in the art desiring to alternately convey molten copper from a blister copper producing furnace to a plurality of blister copper refining (anode) furnaces in accordance with the teachings of Smith, Hoffmann and Bibby would have been led to employ movable hot metal gates at the appropriate or optimum locations of each branch of the branched launders taught by Bibby such that they could block or open the passageways (branches or branch parts of the branched launders) to direct the flow of molten copper to one or the other passageway .

In reaching this determination, we consider the appellants' argument directed to the LaBate disclosure.¹⁴ See, e.g., the Brief, pages 17-18 and 33-41. However, the appellants' argument again fails to consider the combined teachings of the applied prior art references for the reasons indicated *supra*. *Id.* One of ordinary skill in the art desiring to alternately convey molten copper from an upstream furnace to a plurality of downstream furnaces as suggested by Smith, Hoffmann and Bibby would have been led to place movable hot metal gates at the appropriate locations of each branch of a branched launder so as to provide the function (alternating flow) suggested by Smith, Hoffman and Bibby as indicated above.

The appellants argue that the applied prior art references do not teach or suggest the refining step as required by claims 2 through 4. See the Brief, pages 57-60. We do not agree.

As indicated *supra*, Smith teaches employing **rotary** anode furnaces for receiving and treating blister copper. Hoffmann also teaches using anode furnaces in general to treat blister copper. These anode furnaces are known to be "equipped to carry out two steps: a first step, which typically uses air, oxidizes impurities....and a second reduction step which removes the excess oxygen." See the appellants' admission at page 6 of the Brief and Biswas, pages 244-245. The examiner recognizes that Smith and Hoffman do not teach introducing blister copper into an anode

¹⁴ Although La Bate discloses that its invention is directed to using hot metal gates in modular unit blast furnace runners (launders), it teaches or suggests that hot metal gates in general are known for blocking or diverting the flow of various metals in an apparatus as well as launders. Moreover, based on this disclosure, one skilled in the art would understand that these gates are applicable to blocking or diverting molten copper in a launder.

furnace as it is oxidized with an oxygen-enriched air introduced via a tuyere. To remedy this deficiency, the examiner relies on the disclosure of Kappell. See the Answer, pages 7-8. We, like the examiner, find that Kappell teaches refining molten copper by oxidizing it first with oxygen-enriched air (introduced via a nozzle) and then reducing it with a hydrocarbon gas reducing agent successively in a rotary refining furnace as the molten copper is introduced therein. See column 1, lines 12-27, column 2, lines 25-45 and column 2, line 58 to column 3, line 25 and column 4, lines 49-53. This refining step is said to provide various advantages. See column 2, line 55 to column 3, line 2. Thus, we concur with the examiner's determination that one of ordinary skill in the art would have been led to employ the claimed refining step as the refining step of the copper smelting process of Smith or Hoffmann, motivated by a reasonable expectation of obtaining the advantages indicated in Kappell.

The appellants argue that the applied prior art references do not teach or suggest the claimed cover for hermetically sealing the launder means as required by claim 8. See, e.g. the Brief, page 63. As indicated *supra*, Hoffman, for example, teaches conveying molten metal (blister copper) from a blister copper producing means to anode furnaces via a heated launder. Although the applied prior art references do not mention how the molten copper in the launder can be maintained in a heated molten state, Ikoma teaches employing a launder cover in sealed state and burners to ensure the smooth flowing of molten metal in a launder.¹⁵ See pages 1-3. The purpose of Ikoma is to form

¹⁵ It can be inferred from this teaching that the launder cover is used to seal the launder to
(continued...)

a launder useful for transporting a high-temperature melt.¹⁶ See page 1. As such, we concur with the examiner that one of ordinary skill in the art would have been led to employ the claimed features taught by Ikoma in the launder suggested by either Smith or Hoffmann, and Bibby, motivated by a reasonable expectation of successfully and smoothly delivering a high-temperature melt, such as blister copper, to downstream furnaces, such as anode furnaces, in an economical manner.

As a rebuttal to the *prima facie* case of obviousness established by the examiner, the appellants rely on three McCain declarations, two Yamashiro declarations and two Iida declarations.¹⁷ See the Brief, pages 45-46. The appellants rely on the McCain declarations to demonstrate that the claimed subject matter would not have been suggested by the applied prior art references and that the claimed subject matter imparts unexpected results over that of the closest prior art references. See, e.g., the Brief, pages 45-55. The appellants also rely on the Iida declarations to show that “one of ordinary skill in the art would not combine the teachings and disclosures in either Smith or Hoffmann with Bibby.” See the Brief, page 45. The appellants

¹⁵(...continued)
prevent or minimize heat from escaping the launder so as to ensure smooth flow of molten copper therein.

¹⁶ Again, the appellants try to ignore the fact that launders in general are no more than a molten metal transporting device, a device by which molten metal is transported from one location to another location.

¹⁷ The McCain and Iida declarations, like the appellants’ responses to the examiner’s arguments, have evolved in response to the examiner’s arguments in the record.

further rely on the Yamashiro declarations to show a licensing arrangement which according to the appellants, demonstrates unobviousness of the claimed subject matter. *Id.*

We are not persuaded that these declarations are sufficient to rebut the *prima facie* case of obviousness established by the examiner. We initially note that the McCain declarations essentially repeat the appellants' attorney's arguments in the Brief in the form of expert opinions. These so-called "expert opinions", like the appellants' arguments, are based on faulty assumptions and incomplete facts. McCain, for example, does not discuss the fact that both Smith and Hoffman teach employing **launders in general** to **alternately** transport molten copper from an upstream continuous blister copper producing means to a plurality of downstream anode furnaces as indicated *supra*. See the McCain declarations in their entirety, together with, e.g., the Brief, pages 45-55. Nor does McCain recognize that Bibby teaches that its branched launders are useful for **alternately** transporting molten copper from an upstream furnace to a plurality of downstream furnaces. See the McCain declarations in their entirety, together with, e.g., the Brief, pages 45-55. In so doing, McCain ignores the fact that the launders employed by Smith, Hoffmann and Bibby provide the same function, i.e., alternately conveying molten copper from an upstream furnace to a plurality of downstream furnaces and that the launders suggested by Smith or Hoffmann are inclusive of branched launders, such as those disclosed by Bibby. See the McCain declarations in their entirety, together with, e.g., the Brief, pages 45-55. It follows that McCain's opinions are not effective in rebutting the examiner's determination that the combined teachings of either Hoffmann or Smith,

and Bibby would have suggested the subject matter recited in claims 1, 5, 6, 7, 9 and 10 within the meaning of 35 U.S.C. § 103.

Even were we to interpret these claims as requiring the specific selecting means (closing means) recited in claim 7 on appeal or the equivalents thereof, we do not reach any different conclusion. McCain, according to the appellants at page 46 of the Brief, opines that the movable gate (selecting means) disclosed by LaBate is “designed to be consumed when contacted with the molten metal...” However, as indicated *supra*, LaBate teaches

a hot metal gate, which is conventionally used to block or divert the flow of molten metal through a runner (launder) system or in apparatus. See column 1, lines 14-16, 30-33 and 58-64. The hot metal gate can be made of a refractory material **or** a mixture of a refractory material and a consumable material. See column 1, lines 30-39 and 58-68. The consumable material **may be** added so that “the gate has a known life when subjected to molten metal.” See column 1, lines 36-39. “An exterior graphite coating may be used to increase the life of the gate by resisting erosion by the molten metal or slag. The gate is movable in and out of the runners (launders) by a lifting device.” See column 1, lines 42-46.

McCain’s opinion is based on incomplete information regarding the LaBate disclosure.

According to the appellants (Brief, page 48), McCain also states that “the launder system described in LaBate is not suitable for use in a branched launder which continuously delivers copper selectively to plural anode furnaces.” Specifically, the appellants assert that “[p]aragraph 10 of the McCain declaration [executed on December 2, 1999] also confirms that LaBate fails to disclose or suggest arranging the gate 13 in order to alternatively select one, and only one, of the branched troughs, which is impossible in the given embodiment.” See the Brief, page 48. In so stating,

McCain, like the appellants, fails to take into consideration the overall teachings of the applied prior art references. See the McCain declarations in their entirety. McCain simply ignores the fact that the prior art references, namely Smith, Hoffmann and/or Bibby, teach or suggest using launders to **alternately** convey molten copper from a copper producing means to plural anode furnaces (one anode furnace at a time) as indicated *supra*. See the McCain declarations in their entirety. From our perspective, one skilled in the art desiring to provide the above alternating flow arrangement via a branched launder as suggested by Smith and Bibby or Hoffmann and Bibby would have been led to employ an appropriate number of the movable gates taught in LaBate corresponding to the number of the openings of the branches (branch parts) of the branched launders to permit their closing and opening, thus providing molten copper **alternately** to plural anode furnaces.

The appellants also argue that the claimed subject matter imparts unexpected results.¹⁸ See, e.g., the Brief, pages 49-51. In support of this position, the appellants again rely on the McCain declarations. *Id.* According to the appellants (Brief, page 49), McCain opines that the claimed subject matter provides various surprising and unexpected benefits, including “the lack of a need for stopping and retapping the flow of blister copper and the subsequent increase in upstream efficiency caused thereby, as well as the extension of life of upstream furnaces due to a constant level therein.” McCain, however, does not refer to any experimentation, much less any comparative showing

¹⁸ Exhibit Z, a conference paper by at least two of the inventors, is relied upon in the Yamashiro declarations to show that the claimed subject matter has been licensed to at least two plants in other countries. It is interesting to note that contrary to the appellants’ assertion, this paper touts the benefits of only certain unclaimed features, not the claimed branched launder.

between the claimed subject matter and the closest prior art, Smith or Hoffmann, in forming his opinion. See the McCain declarations. There simply is no factual basis for his opinion. *Id.* As such, McCain's opinion is entitled to little or no probative weight in rebutting the examiner's *prima facie* case of obviousness. *See In re Mayne*, 104 F.3d 1339, 1343, 41 USPQ2d 1451, 1455 (Fed. Cir. 1997) ("An examination for unexpected results is a factual, evidentiary, inquiry...").

If the alleged benefits are readily apparent upon simple observation of the claimed invention as implied by McCain, such benefits would have been reasonably expected by one of ordinary skill in the art as indicated *supra*. *See, e.g., Ludwig*, 353 F.2d 241, 147 USPQ 420. As such, the McCain declarations further demonstrate obviousness, rather than unobviousness, of the claimed invention. *See In re Skoner*, 517 F.2d 947, 950, 186 USPQ 80, 82 (CCPA 1975) ("Expected beneficial results are evidence of obviousness of a claimed invention just as unexpected beneficial results are evidence of unobviousness").

The appellants argue (Brief, page 51) that:

The second Declaration of Mr. Yamashiro (5) attests to the licensing of the presently patented technology, and is evidence showing the non-obviousness of the claimed invention. The fact that those skilled in this art are willing to pay for the invention described herein is, as stated by the Federal Circuit, "a solid evidentiary foundation on which to rest a non-obviousness determination". *See Minnesota Mining & Manufacturing Co. v. Johnson & Johnson Orthopedics, Inc.*, 24 USPQ2d 1321 (Fed. Cir. 1992).

However, the second Yamashiro declaration does not indicate the details of the licensing arrangement, e.g., the amount of compensation involved. Nor does it indicate that the licensing is

due to the merits of the claimed subject matter. The appellants simply fail to demonstrate a nexus between the licensing and the merits of the claimed subject matter. *See, e.g., In re Huang*, 100 F.3d 135, 139-40, 40 USPQ2d 1685, 1689-90 (Fed. Cir. 1996); *see also Cable Electric. Prods. v. Genmark, Inc.*, 770 F.2d 1015, 1028, 226 USPQ 881, 889 (Fed. Cir. 1985). In this regard, we note that the conference paper, Exhibit Z, attached to the second Yamashiro declaration authored by two of the three inventors in this application, for example, only touts the benefits of certain unclaimed features, but not the claimed branched launder, as a reason to employ a copper smelting technology disclosed therein.¹⁹

The appellants also appear to rely on the Yamashiro declarations as evidence of commercial success. See the Brief, page 55. However, the appellants have not provided sufficient proof to establish that the claimed smelting apparatus system is commercially successful. See the Yamashiro declarations and their attachments. There is no evidence in this record that the licensing involved constitutes commercial success since the appellants have not provided, *inter alia*, an actual market share and compensation. *Id.* Nor have the appellants demonstrated that the licensing is a direct result of the merits of the claimed invention for the reasons indicated *supra*. *Huang*, 100 F.3d at 139-40, 40 USPQ2d at 1689-90.

¹⁹ Also, the appellants have not demonstrated that the evidence in question is commensurate in scope with the claimed subject matter since two of the three inventors in this application assert that only the unclaimed features impart benefits.

The appellants argue that the claimed subject matter satisfies a long-felt need, thereby rebutting the *prima facie* case established by the examiner. See the Brief, pages 53-54. Specifically, the appellants argue (*Id.*) that:

The present invention arose in addressing a specific long-felt need in modern day continuous copper smelting: how to efficiently and safely interface the continuous production of blister copper with batch-wise operating blister copper refining furnaces without holding up the flow of blister copper in a holding furnace.

However, the appellants have not supplied sufficient evidence to demonstrate that there was a problem (after the invention of Smith or Hoffmann) which existed over a long period of time and that the claimed “invention actually provided a long-awaited, widely-accepted, and promptly-adopted solution to the problem extant in the art.” *See In re Mixon*, 470 F.2d 1374, 1377, 176 USPQ 296, 299 (CCPA 1973).

The appellants do not explain why the Iida declarations are probative in this case. See the Brief, the Reply Brief and Supplemental Brief in their entirety. Only conclusory statements regarding unexpected results and a lack of motivation are presented. *In re Borkowskii*, 505 F.2d 713, 719, 184 USPQ 29, 33 (CCPA 1974).

To the extent that they are relied upon to show unexpected results or a lack of motivation, we find them to be ineffective for the reasons indicated *supra*. We find that Iida’s opinions relating to unexpected results, like those of McCain, are unsupported by facts and are, at best, indicia of

obviousness as they show that the alleged improvements are highly predictable or expected from simple observation. We find that Iida's opinions relating to motivation or suggestion, like those of McCain, also fail to take into consideration the overall teachings of the applied prior art references.

Having considered all of the evidence of record anew, we determine that the evidence of obviousness, on balance, outweighs the evidence of nonobviousness. Hence, we concur with the examiner that the claimed subject matter as a whole would have been obvious to one of ordinary skill in the art in view of the applied prior art references. Accordingly, we affirm the examiner's decision rejecting the appealed claims under 35 U.S.C. § 103.

Further proceedings in this case may be taken in accordance with 35 U.S.C. § 141 to § 145 and § 306, and 37 CFR § 1.301 to § 1.304. Note also 37 CFR § 1.197(b). If the patent owner fails to continue prosecution, the reexamination proceedings will be terminated, and a certificate under U.S.C. § 307 and 37 CFR 1.570 will be issued cancelling the patent claim(s) the rejections of which have been affirmed.

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No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

ADRIENE LEPIANE HANLON
Administrative Patent Judge

CHUNG K. PAK
Administrative Patent Judge

PAUL LIEBERMAN
Administrative Patent Judge

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